

App. No. 15/566,216  
9-2-09 Amendment for Examiner's Amendment

1. (currently amended) A light emitting apparatus comprising:
  - a at least two light emitting elements with different chromaticities; and
  - a light emitting element controller that controls light emitted from the light emitting apparatus so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities, wherein
  - the light emitting element controller controls drive currents ~~or drive voltages~~ of the light emitting elements based on a predetermined function of light emitting element temperature variation and drive current,
  - the predetermined function represents the drive current as a substantially linear function of the temperature,
  - the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and
  - the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the linear function of temperature variation.
2. (canceled)
3. (currently amended) A light emitting apparatus comprising:
  - a at least two light emitting elements with different chromaticities;
  - a light emitting element controller that controls light emitted from the light emitting apparatus so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities; and
  - storage that previously stores drive current values ~~or drive voltage values~~ for a plurality of light emitting element temperatures for controlling the light emitted from the light emitting apparatus so as to be the desired chromaticity, wherein
  - the light emitting element controller controls drive currents ~~or drive voltages~~ of the light emitting elements based on the drive current values ~~or drive voltage values~~ corresponding to a given temperature stored in the storage on condition that a chromaticity of mixed light emitted from the light emitting apparatus is kept constant for temperature variation, and

1 (of 9)

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the drive current values ~~or drive voltage values~~ stored in the storage.

4. (currently amended) A light emitting apparatus comprising:
- a at least two light emitting elements with different chromaticities;
  - a light emitting element controller that controls light emitted from the light emitting apparatus so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities; and
  - a temperature detector, wherein
- the light emitting element controller controls drive currents ~~or drive voltages~~ of the light emitting elements based on a signal from the temperature detector and a predetermined function of light emitting element temperature variation and drive current,
- the predetermined function represents the drive current as substantially linear function of the temperature.
- the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and
- the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the linear function of temperature variation.
5. (currently amended) A light emitting apparatus comprising:
- a at least two light emitting elements with different chromaticities;
  - a light emitting element controller that controls light emitted from the light emitting apparatus so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities;
  - a temperature detector; and
  - a drive time detector, wherein
- the light emitting element controller controls drive currents ~~or drive voltages~~ of the light emitting elements based on signals from the temperature detector and the drive time

✓

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

detector, and a predetermined function of light emitting element temperature variation, drive time and drive current,

the predetermined function represents the drive current as substantially linear function of the temperature,

the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and

the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the linear function of temperature variation.

6. (currently amended) A light emitting apparatus comprising:

at least two light emitting elements with different chromaticities;

a light emitting element controller that controls light emitted from the light emitting apparatus so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities; and

a temperature setter, wherein

the light emitting element controller controls drive currents ~~or drive voltages~~ of the light emitting elements based on a value set in the temperature setter and a predetermined function of light emitting element temperature variation and drive current,

the predetermined function represents the drive current as substantially linear function of the temperature,

the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and

the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the linear function of temperature variation.

7. (previously presented) The light emitting apparatus according to claim 1, wherein the light emitting element controller controls light emitted from the light emitting apparatus, the light

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

mixed by at least two light with different chromaticities, so as to be a desired chromaticity that belongs to white light.

8. (previously presented) The light emitting apparatus according to claim 1, wherein the light emitting elements are light emitting diodes (LEDs).

9. (currently amended) An LED lighting comprising:

LEDs with three different chromaticities of red, blue and green LEDs;

an LED controller that controls light emitted from the LED lighting so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities;

the LED controller controls drive currents ~~or drive voltages~~ of the LEDs based on a predetermined function of LED temperature variation and drive current, the predetermined function representing the drive current as a substantially linear function of the temperature, and thus controls the light emitted from the LED lighting so as to be white light, wherein

the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and

the LED controller drives one LED with any one of the chromaticities at a constant current and another LED with another chromaticity adjustably based on the linear function of temperature variation.

10. (original) The LED lighting according to claim 9, wherein the red LED is driven at a constant current.

11. (canceled)

12. (currently amended) An LED lighting comprising:

LEDs with three different chromaticities of red, blue and green LEDs; and

an LED controller that controls light emitted from the LED lighting so as to be a desired chromaticity and a desired luminance of the emitted light which is mixed by at least two lights with different chromaticities, wherein

4

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

the LED controller controls pulse drive periods of drive currents ~~or drive voltages~~ of the LEDs based on a predetermined function of LED temperature variation and drive current, the predetermined function representing the drive current as a substantially linear function of the temperature, and thus controls the light emitted from the LED lighting so as to be white light with the desired luminance,

the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and

the LED controller sets one drive current value of one LED with one chromaticity as constant, and controls another drive current value of another LED with another chromaticity adjustably based on the linear function of temperature variation.

13. (currently amended) An LED lighting comprising:

LEDs with four different chromaticities of red, blue and green LEDs, and a white LED that can emit white light and is composed of a semiconductor light emitting element capable of emitting ultraviolet rays or visible light and a phosphor emitting luminescent radiation caused by excitation of light emitted from the semiconductor light emitting element; an LED controller that controls light emitted from the LED lighting so as to be a desired color rendering level of the emitted light which is mixed by at least two lights with different chromaticities;

a temperature setter or a temperature detector; and

a drive time detector, wherein

the LED controller controls drive currents ~~or drive voltages~~ of the LEDs based on a detected value from the temperature detector, a signal from the drive time detector and a predetermined function of LED temperature variation, drive current and drive time and thus controls the light emitted from the LED lighting so as to be the desired color rendering level as white light, the predetermined function representing the drive current as a substantially linear function of the temperature, wherein

the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and

5

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

the LED controller drives one LED with any one of the chromaticities at a constant current and another LED with another chromaticity adjustably based on the linear function of temperature variation.

14. (previously presented) An LED light emitting apparatus comprising:

LEDs of at least red, blue and green colors; and

a control portion having

a non-volatile memory capable of receiving or providing information for chromaticity maintenance for temperature of the LED light emitting apparatus;

a control circuit that can read the information on respective colors and write control information into red, blue and green color setting registers at power startup,

a calculation circuit that performs calculation based on signals from the respective color setting registers and a temperature information signal that is received from a temperature measurement element through a temperature information processing portion, digital-analog converters for respective colors that converts output from the calculation circuit, and

current sources for respective colors that provide drive currents for the red, blue and green LEDs, wherein

the information for chromaticity maintenance for temperature that is received, provided by and from the non-volatile memory contains predetermined functions of drive current; a temperature coefficient, and reference chromaticity and luminance data; or drive current values for temperatures,

the predetermined function of drive current for the red LED represents that a control current value is constant for temperature, and the predetermined functions of drive current for green and blue LEDs represent that control current values are substantially linear functions of temperature,

the predetermined functions of drive current for green and blue LEDs are set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and

the control portion sets a drive current value of red LED as constant, and controls drive currents value of green and blue LEDs adjustably based on the linear function of temperature variation.

6

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

15. (canceled)
16. (currently amended) An LED light emitting apparatus comprising:  
LEDs of at least red, blue and green colors; and  
a control portion having  
a non-volatile memory capable of receiving or providing information for chromaticity and luminance maintenance for temperature of the LED light emitting apparatus; a control circuit that can read the information on respective colors and write control information into red, blue and green color setting registers at power startup;  
a calculation circuit that performs calculation based on signals from the respective color setting registers and a temperature information signal that is received from a temperature measurement element through a temperature information processing portion,  
digital-analog converters for respective colors that converts output from the calculation circuit, and  
current sources for respective colors that provide drive currents for the red, blue and green LEDs, wherein  
the information for chromaticity and luminance maintenance for temperature that is received, provided by and from the non-volatile ~~memory~~ memory, contains predetermined functions of drive ~~current;~~ current, a temperature coefficient, and reference chromaticity and luminance data; ~~or drive current values for temperatures~~, the predetermined function of the LED with another chromaticity representing the drive current as a substantially linear function of the temperature,  
the predetermined functions of drive current for green and blue LEDs are set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and  
the control portion sets a drive current value of red LED as constant, and controls drive currents value of green and blue LEDs adjustably based on the linear function of temperature variation.
17. (canceled)
18. (currently amended) An LED light emitting apparatus comprising:  
LEDs of red, blue and green colors;

NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

current sources for the LEDs of respective colors that are electrically connected to the LEDs;  
digital-analog converters for respective colors that are electrically connected to the current sources;  
setting registers for the LEDs of respective colors that are electrically connected to the digital-analog converters;  
a control circuit that is electrically connected to the setting registers; and  
a non-volatile memory that is electrically connected to the control circuit, wherein the control circuit includes electrical input wire connection of temperature information through a temperature information processing portion from a temperature sensing element of the LEDs, wherein  
the control circuit calculates control current values for LEDs of respective ~~colors~~ colors, based on current setting data for ~~temperature or temperature stored in the setting registers~~, based on predetermined functions of drive current stored in the non-volatile memory, and the temperature information that is provided therein, and thus performs light emission control drive of the LEDs ~~based on the values that are provided into the setting registers~~, the predetermined function ~~being expressed~~ expressing the drive current as a substantially linear function of the temperature,  
the predetermined functions ~~is set~~ are set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value, and  
the control circuit sets one drive current value of one LED with one chromaticity as constant, and controls another drive current value of another LED with another chromaticity adjustably based on the linear function of temperature variation.

19. (previously presented) The LED light emitting apparatus according to claim 14, wherein the red LED is composed of a AlInGaP group semiconductor material, and the blue and green LEDs are composed of a nitride group semiconductor material.

20. (currently amended) A control method of a light emitting apparatus that comprises at least two light emitting elements with different chromaticities, and a light emitting element controller that controls light emitted from the light emitting apparatus, the light mixed by at least two light

8



NOT OF RECORD. FOR EXAMINER'S INITIATED INTERVIEW ONLY
--

with different chromaticities respectively, so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities, wherein

the light emitting element controller controls the light emitting elements based on a predetermined function of light emitting element temperature variation and drive current, the predetermined function ~~being expressed~~ expressing the drive current as a substantially linear function of the temperature,

the predetermined function is set based on an actual measurement of the chromaticity of mixed light in order to adjust the chromaticity of mixed light to be a predetermined constant value. and

the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the linear function of temperature variation.

21. (currently amended) A light emitting apparatus comprising:

at least two light emitting elements with different chromaticities; and

a light emitting element controller that controls light emitted from the light emitting apparatus so as to be a desired chromaticity of the emitted light which is mixed by at least two lights with different chromaticities, wherein

the light emitting element controller controls drive currents ~~or drive voltages~~ of the light emitting elements based on pre-stored data ~~representing~~ a relation between temperature and current on condition that a chromaticity of mixed light emitted from the light emitting apparatus is kept constant for temperature variation, and

the light emitting element controller sets one drive current value of one light emitting element with one chromaticity as constant, and controls another drive current value of another light emitting element with another chromaticity adjustably based on the pre-stored data.

22. (canceled)

9